APPLICATION

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TITLE: PROVIDING INTERACTIVE LINKS IN TV PROGRAMMING

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PROVIDING INTERACTIVE LINKS IN TV PROGRAMMING

Technical Field

This application relates to providing interactive links in television (TV) programming, for example, for use in a web-based TV system.

Background

The computer system 100 illustrated in Fig. 1 represents a typical hardware setup for executing software that allows a user to perform tasks such as communicating with other computer users, accessing various computer resources, and viewing, creating, or otherwise manipulating electronic content -- that is, any combination of text, images, movies, music or other sounds, animations, 3D virtual worlds, and links to other objects. The system includes various input/output (I/O) devices (mouse 103, keyboard 105, display 107) and a general purpose computer 100 having a central processor unit (CPU) 121, an I/O unit 117 and a memory 109 that stores data and various programs such as an operating system 111, and one or more application programs 113. The computer system 100 also typically includes some sort of communications card or device 123 (e.g., a modem or network adapter) for exchanging data with a network 127 via a communications link 125 (e.g., a telephone line).

As shown in Fig. 2, a user of a computer system can access electronic content or other resources either stored locally at the user's own client system 202 (for example, a personal or laptop computer) or remotely at one or more server systems 200. An example of a server system is a host computer that provides subscribers with online computer

services such as e-mail, e-commerce, chat rooms, Internet access, electronic newspapers and magazines, etc. Users of a host computer's online services typically communicate with one or more central server systems 200 through client software executing on their respective client systems 202.

In practice, a server system 200 typically will not be a single monolithic entity but rather will be a network of interconnected server computers, possibly physically dispersed from each other, each dedicated to its own set of duties and/or to a particular geographical region. In such a case, the individual servers are interconnected by a network of communication links, in known fashion. One such server system is "America Online 4.0" from America Online, Incorporated of Virginia.

A "browser" is an example of client software that enables users to access and view electronic content stored either locally or remotely, such as in a network environment (local area network (LAN), intranet, Internet). A browser typically is used for displaying documents described in Hyper-Text Markup Language (HTML) and stored on servers connected to a network such as the Internet.

A user instructs a browser to access an HTML document, or webpage, by specifying a network address -- or Uniform Resource Locator (URL) -- at which a desired document resides. In response, the browser contacts the corresponding server hosting the requested webpage, retrieves the one or more files that make up the webpage, and then displays the webpage in a window on the user's computer screen.

Fig. 3 is a screenshot of a browser application 300 (Microsoft Internet Explorer) displaying a typical HTML document, or webpage 302. As shown therein, a single webpage 302 may be composed of several different files

potentially of different data types 304 (for example, text, graphics, images, virtual worlds, sounds, movies, etc.). In addition, a webpage can include links 306 pointing to other resources (for example, webpages or individual files) available on the network. Links 306 can take virtually any visual form, for example, they can appear either as a text string or as a graphical image or a combination thereof. Each link 306 has an associated URL pointing to a location on the network. When a user clicks on, or otherwise selects a displayed link 306, the browser automatically will retrieve the webpage (or other resource) corresponding to the link's associated URL and display it to, or execute it for, the user.

Referring to Fig. 4, a "web-based TV" system 400 has been developed that makes dual usage of conventional TV sets 402. That is, a user of web-based TV either can watch TV or view webpages and otherwise "surf" the Internet. In this regard, a special purpose computer 404, referred to as a "set top device," is used in connection with standard TV sets 402 for viewing webpages on the Internet. The set top device 404 essentially has the same basic components as the general purpose computer 100 illustrated in Fig. 1, except that it also includes a TV tuner 406 for receiving TV programming in the form of broadcast and/or cable TV signals. The set top device 404 thus can selectively display two different sources of content (TV programming received by TV tuner 406 and web or network content received by communications card 123) on a TV monitor 402 connected to the set top device 404.

Accessories may be added to the web-based TV system 400, for example, a wireless keyboard 408. The wireless keyboard 408 can be similar to keyboard 104 but it also may have specialized keys designed for use in the web-based TV

system 400 to make viewing and web surfing easier. Additionally, a wireless remote control 410 may be used to control the set top device 404 and to facilitate channel surfing and web-based TV connections via various buttons 412, which may be specialized for the web-based TV environment.

An example of an existing web-based TV system 400 is "WebTV" by Microsoft. Information about WebTV service may be found at WebTV's various webpages, for example, at http://www.webtv.net and http://developer.webtv.net.

One feature provided by conventional web-based TV systems is referred to as "interactive TV links." The function of an interactive TV link is to enable a viewer to access Internet content (that is, content received over the communications card 123) while watching TV programming on the TV monitor 402. Typically, interactive TV links are used to provide viewers with supplemental information related to the current TV program.

Figs. 5A and 5B are screenshots showing an example of a conventional interactive TV link. As shown in Fig. 5A, a viewer is watching a TV program, namely, The Weather Channel, on the TV monitor 500. To provide a link to Internet content related to the current TV program, the set top device overlays a graphic symbol 504 on top of the TV program in the right hand corner of the TV monitor 500. This graphic symbol 504 informs the viewer that related Internet content is available. If the viewer then clicks on the graphic symbol 504 (which serves as a link to a predetermined URL), for example, using the wireless remote control 410, the set top box retrieves the related content (namely, a weather map image 506) from the Internet and displays it on the TV monitor 500, as shown in Fig. 5B.

In the conventional web-based TV system, the interactive TV link essentially is a static graphic symbol displayed by the set top box in a fixed location on the TV monitor. Internet and TV content providers (e.g., broadcasters) have little or no control over how or where the interactive link appears on the TV screen. In addition, the functionality provided by conventional interactive TV links typically is predetermined and limited in scope. Accordingly, the present inventors recognized that it would be desirable to provide interactive TV links that give TV and Internet content producers enhanced flexibility and control over the appearance, location and uses of interactive links in TV programming.

Summary

Various implementations may include one or more of the following features.

A system for providing interactive links in television (TV) programming may include a set top device having communications links for receiving computer network content or TV signals or both, and a monitor for displaying received computer network content and TV signals. The TV signals can include one or more frames including an embedded graphic symbol. The system also may include an input device for receiving user input from a viewer, and software instructions stored within the set top device (i) for generating a webpage having an active region corresponding to the graphic symbol, and (ii) for triggering a predetermined action associated with the active region in response to viewer input.

A method of providing interactive links in TV programming may involve receiving a TV signal including a graphic symbol (e.g., a network logo) and generating a

webpage having an active region (e.g., hotspot) corresponding to, for example, in registration with, the graphic symbol. The active regions can be transparent or they can have visual characteristics to enhance the underlying graphic or otherwise provide visual cues to the viewer. A predetermined action (e.g., displaying a specified webpage) associated with the active region is performed in response to viewer input, for example, selection of the active region.

The received TV signal may include TV picture data having the graphic symbol embedded therein. The graphic symbol may be specified by a broadcaster of the TV signal. The TV signal also may include (for example, in the vertical blanking interval) information defining the active region to be generated and/or defining the predetermined action to be triggered. Alternatively, or in addition, information defining the active region and/or the predetermined action can be specified prior to receiving the TV signal.

Generation of the active region corresponding to the graphic symbol may involve generating a webpage having a link to a resource. The active region may be substantially in registration with the graphic symbol received in the TV signal. In addition, the active region may be a same size and shape and at a same location as the received graphic symbol, or the active region may roughly approximate the size, shape and/or location of the received graphic symbol. The generated active region can be visually transparent to the viewer or it can be visible, for example, translucent or highlighted. If visible, the active region may be used to enhance the received graphic symbol's appearance. A visible active region can serve as a visual cue to the viewer that the active region is available.

The appearance of a visible active region can be modified in response to an event (e.g., viewer selection of the active region), with the passage of time, or based on the current context, for example, based on whether or not the set top device is logged into an online service provider host system. Modifications to the active region's appearance may include changing one or more of the following visual characteristics of the active region: transparency, translucency, color, shape, size or location.

Triggering of the predetermined action may be in response to viewer input such as selection of the active area, and may involve accessing a resource linked to the active region. The accessed resources may include one or more of the following: a webpage, a text file, a sound file, an image file, a movie file, or a 3D world. Alternatively, or in addition, the accessed resource may include a communications utility that enables the viewer to communicate with others, for example, an email program, an instant messaging program, or a chat program. The accessed resource also may involve a local function such as a TV or VCR control operation.

Prior to triggering the predetermined action, the predetermined action associated with the active region can be modified, for example, in response to an event (e.g., user action), based on the passage of time, based on a current context (e.g., online / offline state). Modification of the predetermined action may involve changing an address of a link associated with the active region to specify a different resource.

The received TV signal may include a single graphic symbol within a TV frame or a plurality of graphic signals within a single TV frame. In the latter case, a separate active region can be generated for each graphic signal.

Each active region can have its own associated predetermined action.

One or more of the following advantages may be realized. The techniques and methods described here enable a web-based TV system to provide interactive links in TV programming in a more flexible, creative and robust manner. TV content providers (e.g., TV broadcasters) are not limited to using interactive links having a single fixed, static design determined by a third party (e.g., the company that designed and/or sells the set top device), but rather can pick the style, color, design, shape, size, and location of their interactive links based on their own preferences and commercial objectives. In addition, content providers not only can associate an interactive link with a specific URL of a webpage to be displayed, but also can specify other types of actions to be taken, for example, actions to be performed locally by the set top device.

Moreover, using the techniques described here, content providers can include multiple interactive links within a single screen of program content. Each link can have its own appearance, location and associated action or behavior as desired by the TV content provider. By providing various parameters, the TV content provider also can specify different manners in which the interactive link can be highlighted by the set top box, in order to provide viewers with visual cues about the available functionality.

In this way, the TV content provider is responsible for the appearance, location and behavior of interactive links, while the set top device is responsible for the links' trigger mechanisms (for example, active areas or hotspots generated or displayed in registration with a graphic symbol in the TV program content). As a result, an efficient and economical separation of duties is realized.

The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description, drawings, and claims.

Drawing Descriptions

Fig. 1 is a block diagram of a computer system.

Fig. 2 shows a typical network computing environment.

Fig. 3 shows a screenshot of a browser displaying a webpage.

Fig. 4 is a block diagram of a set top device.

Figs. 5A and 5B are screenshots showing an example of conventional interactive links in a web-based TV environment.

Figs. 6A, 6B and 6C are screenshots showing examples of using interactive links in a web-based TV environment.

Fig. 7 is an exploded view of a TV content screen and an interactive link overlay page.

Figs. 8A, 8B, 8C and 8D are screenshots showing examples of using interactive links in a web-based TV environment.

Fig. 9 is a data diagram of a TV frame including interactive link definition information.

Fig. 10 is a flowchart of using interactive links in a web-based TV environment.

Like reference numbers and designations in the various drawings indicate like elements.

Detailed Description

Figs. 6A, 6B and 6C are mockups of screenshots showing examples of increased flexibility and functionality as provided by the interactive link mechanisms and

techniques described here. In general, the set top device is capable of overlaying a webpage, defining one or more hotspots or active regions, on top of a screen of TV program content. The hotspots essentially can be any shape or size and can be located at any location on the TV screen, for example, in registration with a graphic within the TV broadcast signal. The hotspots can be visually transparent to the viewer or they can have varying degrees of translucency to enhance or highlight the underlying graphic. Accordingly, rather than being limited to a single interactive link displayed at a fixed location on the screen and having a static, predetermined appearance, interactive links can be provided at any location and can have any desired appearance.

Fig. 6A shows a screen 600 of TV program content (i.e., as received by the TV tuner in the set top device) as it would appear on a conventional TV monitor. As shown, the TV program content includes a TV station graphic or logo 602, a display of a U.S. map 604, including the mainland 603 and separate display regions 605 and 607 for Alaska and Hawaii respectively, and a scrolling region 606 at the bottom of the screen 600. The scrolling region 606 includes names of U.S. cities 608 which scroll across the TV screen from left-to-right at a readable pace.

Fig. 6B is an example of a webpage 610 that could be generated and overlaid by the set top device on top of the screen of TV program content shown in Fig. 6A. In this example, the webpage overlay 610 includes 58 hotspots, each of which is capable of individually invoking an associated resource when selected by the viewer (e.g., user of the set top device). In this example, each of the 48 states within the mainland portion of the United States 614, plus the two boxes 618 and 628 corresponding to Alaska and Hawaii,

respectively, represents a separately selectable hotspot. In addition, the logo 612 is a separate hotspot as is each of the buttons 622 overlaying the scroll region. Each of the hotspots 612, 614, 618 and 620 are located on the webpage to be in registration with their respective underlying graphics in the TV program content (elements 602, 603, 605 and 607 respectively). For example, hotspot 612 is defined to be the same shape, size and at the same screen location as its associated graphic, the TV station logo 602. Accordingly, whenever a viewer moves a cursor or other input selection device to a position on the TV screen such that the cursor is on top of the logo 602, the cursor necessarily also falls within hotspot 612. If the user then clicked the cursor input device at that point, hotspot 612 thereby would be selected, and the action associated with hotspot 612 would be performed.

The webpage hotspots either can be completely transparent to viewers or they can have varying levels of translucency or other visual features and/or colors to enhance the underlying graphics. In Fig. 6B, for example, the hotspots 612, 614, 618 and 620 are completely transparent to viewers, as indicated in the figure by dotted lines. Accordingly, for such transparent hotspots, a viewer will see only the underlying graphic broadcast as part of the TV signal, which serves as an indicia of an available interactive link.

In contrast, hotspots 622 are not transparent but rather have visual features (namely, a button frame) that overlay and enhance the underlying graphics (i.e., the names of the cities displayed in the scrolling region 606 of the TV signal). In the example of Fig. 6B, the button frame hotspots 622 are overlaid on the names 608 of the scrolling

cities to give visual cues to viewers that they represent selectable interactive links.

Alternatively, or in addition, a hotspot could have a varying appearance depending on context. For example, in Fig. 6B, the hotspot 616 for Colorado ordinarily is transparent to viewers but under certain conditions, for example, upon being pointed to or selected by a viewer, the associated appearance of the hotspot could change. In this example, the set top device changes the hotspot 616 for Colorado from transparent to visible (black border with diagonal hash marks) upon being selected by the viewer.

Fig. 6C is a simulated screenshot of what a TV viewer would see when the webpage of Fig. 6B is overlaid on top of the TV program content of Fig. 6A. As shown, the appearance of TV station logo 602 and, for the most part, of the United States map 604, remains unchanged. The only difference in these regions that would be visually perceptible to viewers is the appearance of the state of Colorado, which has a visible hotspot 616 overlaid thereon, for example, either persistently or only when cursor 624 is placed within the hotspot 616.

In contrast, the visual appearance of the scrolling region 606 is changed dramatically by the hotspot overlays 622. As shown, the grey background of the scrolling region 606, as well as the city names 608, are visible through the hotspot button frames 622 to give the appearance of selectable, scrolling buttons, each associated with a different city 608.

The behavior of each of these hotspots (i.e., the action that results when a hotspot is selected by a viewer) is individually controllable. For example, when a viewer selects one of the hotspots overlaying a state, for example, hotspot 616 overlaying Colorado, a webpage showing

information on statewide weather for Colorado could be displayed. Similarly, selecting one of the button hotspots 622 could result in the display of a weather webpage for the corresponding city 608. A click on the TV station logo 602 could cause one or more actions to be undertaken, for example, displaying the TV station's home webpage, launching an email client to send an email message to the TV station, and/or playing an audio file of station identification information (e.g., an announcer stating "This is Weather Station 2000 on channel 3, KABQ, Albuquerque, New Mexico").

In other possible examples, a hot spot could have a tri-state or multi-state appearance depending on context. For example, a hotspot 622 could be transparent in the default state but could then adopt a second, different appearance (e.g., a button) in response to a predetermined condition (e.g., viewer moves cursor across associated region of the TV screen). A third and different appearance for the hotspot 622 (e.g., a depressed button) then could be displayed by the set top device in response to another predetermined condition (e.g., viewer selects hotspot). In addition, a hotspot could exhibit multiple behaviors depending on context, for example, pointing to a first resource when the hotspot had a first appearance but pointing to a second, different resource when the hotspot changed appearance.

In this manner, the visual appearance and/or behavior of a hotspot could be changed dynamically in response to external stimuli to provide enhanced visual cues to viewers. The set top device ordinarily retains local control over the appearance of hotspots, but input from external sources (e.g., a host computer or the VBI of a TV signal, as discussed below) could be used to modify the appearances depending on context and preferences. The

various characteristics of a hotspot -- for example, its location, size, appearance, translucency, transparency, selectability, behavior, etc. -- can be specified in known fashion using features of programming tools such as HTML or XML (extended markup language).

Fig. 7 is a diagram showing how a webpage 700 is overlaid on top of a screen of TV program content 702 defined by TV signals. The view of Fig. 7 is exploded along the Z axis, which is defined as running from the viewer's eyepoint 708 through and perpendicular to the TV screen.

As shown, the TV content screen 702 includes a graphic 704 which is part of the TV signal received from the TV broadcaster. In and of itself, the graphic 704 provides no functionality or interactivity other than its appearance. This non-functional graphic 704 can be made interactive in a web-based TV environment by overlaying the webpage 700, having a hotspot 706 in registration with graphic 704, on top of the TV content screen 702.

In the example of Fig. 7, the webpage overlay 700 and the hotspot are transparent -- i.e., they are visually imperceptible to viewers. Though transparent, hotspot 706 represents a selectable link having an associated functionality (e.g., a resource located at a specified URL). Accordingly, even though a viewer perceives no visual difference as a result of the webpage overlay 700, its presence effectively transforms graphic 704 into an interactive link. The graphic 704 and the hotspot 706 can have virtually any shape, size or location on the TV screen. In addition, although the hotspot 706 is shown to have an identical shape, size and location as its underlying graphic 704, such perfect registration is not required. Rather, to save processing time and reduce memory requirements, hotspot 706 could have a simpler shape (e.g., circular or

rectangular) and size such that it is roughly, but not precisely, coextensive with its underlying graphic.

By dividing responsibilities for displaying the underlying graphic and providing a corresponding hotspot, enhanced functionality and an efficient separation of duties are realized. In a basic interactive link implementation, the TV broadcaster need only embed its graphic in the TV signal in a conventional manner and then specify a few parameters to the set top device -- for example, the desired location of a hotspot and an action associated with the hotspot. In response, the set top device simply generates a hotspot at the specified location, senses if and when the hotspot is selected by the viewer, and then triggers the corresponding action.

Moreover, the set top device can support a rich set of other functionalities to enhance the uses and appearance of interactive links. For example, multiple interactive links can be used and can adopt virtually any size, shape, location or orientation. Translucency or other visual characteristics can be applied to hotspots within a webpage overlay to enhance or compliment the appearance of an underlying TV graphic. In addition, the appearance and/or resources pointed to by interactive links can vary with context or in response to external factors. These additional functionalities are available to TV broadcasters but need not necessarily be used. Rather, TV broadcasters can choose to use only the more basic features to quickly and simply display and use interactive links. But because the additional functionalities are available, TV broadcasters also can have broad flexibility and ultimate control over how interactive TV links appear and behave in a wide variety of different situations.

Figs. 8A-8D are mockups of successive screenshots showing examples of using some of the interactive link features discussed above. Fig. 8A shows a screen of TV program content 800 having various graphics 802, 804 and 806 embedded therein (i.e., as part of the TV broadcast signal). Depending on the TV broadcaster's preferences, any or all of these graphics are eligible to be used as interactive links. In this example, however, only graphics 804 and 806 are used as interactive links.

Depending on the TV broadcaster's objectives and preferences, an interactive link need not necessarily be coextensive with an underlying graphic. Rather, as shown in Fig. 8B, a subset 808 of graphic 804 can be used as an interactive link by specifying the size and location of the corresponding hotspot that is generated in the webpage overlay. In this example, the TV broadcaster has specified that the hotspot is to correspond with subset 808, rather than to the entire graphic 804, and that a highlight box 810 is to be displayed around the subset 808. The highlight box 810 provides a visual cue to the viewer that subset 808 is an interactive link available for selection.

In this example, when the viewer selects the hotspot outlined by highlight box 810, which corresponds to a soon-to-be-broadcast baseball game between the New York Mets and the Colorado Rockies, the viewer is presented with a webpage 812 as shown in Fig. 8C, which provides details about the upcoming game, for example, the lineups for the two teams, statistics for their players, etc. Similarly, when the viewer selects the hotspot associated with graphic 802 in Fig. 8B, which shows the current score and elapsed time of the soccer game currently being displayed on the TV screen 800, a webpage 814 as shown in Fig. 8D is displayed

providing further details on the current game, such as the time remaining, details on scoring, etc.

Although not used in this example, the remaining graphic 806 in Fig. 8A, which displays the network logo, could also be used as an interactive link having its own associated action, for example, displaying the network's home webpage.

As noted above, to make a graphic in a TV signal into an interactive link, typically the TV broadcaster will need to specify various different parameters including one or more of the following: the size, location and/or shape of a desired hotspot, appearance of the hotspot (e.g., transparent, translucent, color, tri-state or varying appearance, etc.), the time(s) at which the hotspot should be activated, behavior(s) associated with the hotspot, etc. In various implementations, one or more of these parameters can be predetermined, or default values can be used if left unspecified, to simply operations. For example, in one implementation, a TV broadcaster could provide data specifying all of the above parameters, while in another implementation, a TV broadcaster would need only to specify the location and desired behavior of a hotspot, and default values would be used for the unspecified parameters.

Regardless of how many variable parameters are used in an implementation, typically a TV broadcaster will need to communicate to the set top device at least some data defining the appearance, behavior and/or location or one or more hotspots. Various different mechanisms can be used in this regard. For example, by previous arrangement, the TV broadcaster could inform an online services provider (e.g., a host computer network that communicates directly with, and is capable of controlling, the set top device) that a hotspot of a specified size, shape and location should be

generated at a specified time and for a specified duration, if the viewer happened to be tuned to a certain TV station at the specified time. In addition, the TV broadcaster could inform the online services provider ahead of time what appearance the hotspot should have (e.g., transparent or highlighted) and what behavior it should exhibit when selected. The online services provider then could download this information to viewers' set top devices, which would implement the agreed upon parameters in providing the interactive links in TV programming.

An alternative, and perhaps more automated mechanism for communicating this information involves the use of vertical blanking intervals (VBIs) in TV frames. As shown in Fig. 9, the standard NTSC TV signal used in the United States is made up of "frames" that are broadcast at a rate of 30 each second. Each frame is formed of 525 scan lines divided equally into two separate and contiguous fields, Field 1 and Field 2. Each field includes 262.5 scan lines, 241.5 of which carry visible TV signal information - that is, portions of the TV picture.

The first 21 lines in each field represent the VBI. The VBI corresponds to the period of time that it takes the electron beam emitted by the TV set's cathode ray tube (CRT) to reposition itself from the bottom of the TV screen to the top of the screen (also referred to "vertical retracing"). After each field is received and displayed the electron beam must be repositioned in this manner before drawing the first scan line of the next field may commence. Accordingly, no visible TV signal information can transmitted during the VBI, otherwise TV signal information would be lost. Instead, other types of information (basically any type of information other than visible TV signal data) may be transmitted to the viewer's TV receiver and used for various

purposes, for example, closed captioning, teletext, electronic program guide information, etc. The amount of data that can be transmitted in this manner is roughly equal to the capacity of a 9600 baud modem for each available scan line in the VBI.

Accordingly, in one implementation, data defining the various interactive link parameters can be communicated directly from the TV broadcaster to a set top device within the VBIs of a TV signal. As shown in the example of Fig. 9, definitions for two different hotspots are transmitted to the set top device in each VBI. Specifically, the VBI for Field 1 includes definitions for hotspots 1 and 2 (HS1 and HS2) while the VBI for Field 2 includes definitions for hotspots 3 and 4 (HS3 and HS4). Of course, essentially any other number of hotspots (from zero to a number corresponding to the bandwidth of the VBI and/or the processing capacity of the set top device) could be used instead. For each TV field received, the set top device extracts this information from the VBI on the fly and uses it to generate a webpage overlay having hotspots of the appropriate sizes, shapes and appearances at specified locations on the TV screen.

As shown in the example of Fig. 9, in one possible implementation, a hotspot definition includes six different fields: handle 901, location 903, size 905, highlight 907, action 909 and extension 911. These fields are not necessarily required or essential for implementing interactive links, but rather are included in this example merely to show the types of information that could make up a hotspot definition. In addition, the hotspot definitions of Fig. 9 are not necessarily comprehensive. Rather, several additional or different parameters relating to the appearance, location, size, shape and behavior of an

interactive link could be specified in a definition structure.

In this example, the handle field 901 refers to an internally used identifier for each hotspot, for example, HS1 or HS2. A handle 901, could be either a unique name or could be implemented as a globally unique identifier (GUID).

The location field 903 refers to the screen location, e.g., as specified in screen coordinates at which the hotspot should be generated. The location field 903 either could specify a single location (e.g., the center or upper left corner of the hotspot) or it could specify several different data points to define the hotspot's location (e.g., upper left corner, lower right corner, etc.). Similarly, the size field 905 could be a single value, for example, defining a relative size (e.g., small, medium or large) or it could be a data structure fully defining the geometrical size and/or shape of the hotspot.

The highlight field 907 could be used to control the visual appearance of the hotspot. For example, the highlight field 907 could include data specifying transparency, translucency, shape (e.g., button), colors, special effects (e.g., flashing), tri-state appearance information, how the appearance should change in response to sensed external stimuli, different alternative appearances for different contexts (e.g., whether the set top device was online (logged into the online service provider network) or offline (not logged into the online service provider network).

The action field 909 could hold data defining the type of action to be undertaken when the hotspot is selected by the viewer. This could be as basic as a single URL to be accessed or various different URLs could be included in the action field 909, for example, corresponding to different

contexts that might arise. In that case, a different action could be undertaken depending on the current context. For example, selecting a hotspot could result in different behaviors depending on whether or not the set top device was logged into the online service (a first context) or offline (a second context). In addition, the action field 909 could include non-URL data, for example, data defining actions to be taken by the set top device (e.g., change TV broadcast channel, start VCR, etc.) potentially without having to access any network resources.

The extension field 911 essentially could serve as a hook to specify or handle any special data types or other extensions to interactive link functionality. For example, the extension field 911 could hold data specifying that the hotspot under consideration should be repeated once every 5 minutes for one minute durations over the next hour. In response, the set top device could cache the webpage overlay corresponding to that hotspot and simply re-display it periodically without having to regenerate the webpage again from scratch each time that it was to be overlaid on the TV screen. Moreover, in that case the TV broadcaster would not have to retransmit the hotspot definition every time a periodic hotspot was desired. Accordingly, this capability would help preserve processing and communications bandwidth.

Alternatively, or in addition, the extension field 911 could be used to implement a "delta" implementation for hotspot definitions. That is, the extension field 911 could hold an indication that a newly received hotspot definition does not completely define a webpage page overlay but rather defines a difference (either additive or subtractive) between a previously defined webpage overlay and a new desired webpage overlay. In this manner, new hotspots could be added to an existing overlay, and/or old hotspots could

be removed, without having to completely define the webpage overlay from scratch. This capability similarly would help preserve processing and communications bandwidth.

Fig. 10 is a flowchart showing the basic operations that a set top device would take to implement interactive links in the manner described above. First, the set top device extracts the hotspot definition information from the VBI (step 1000). Next, the set top device uses the hotspot definition information to generate an appropriate webpage and overlays it on top of the TV program content (step 1002). While the webpage overlay remains on the screen, the set top device monitors for viewer input indicating that a particular hotspot has been selected (step 1004). Upon sensing that a viewer has clicked on a hotspot, the set top device then would initiate the action associated with the selected hotspot, for example, by retrieving and displaying a webpage located at a URL specified in the hotspot definition by the TV broadcaster (step 1006). This process of Fig. 10 essentially would performed each time a VBI is received that contains hotspot definition information.

Other implementations of and uses for the interactive link techniques described above are possible. An interactive link can have as its associated action virtually any computer-implemented functionality or resource. In the basic case, selecting an interactive link can cause a webpage of electronic content (text, images, etc.) to appear on the TV screen, either instead of or in combination with the TV broadcast signal. Alternatively, interactive links can be used to trigger sounds, movies, or other utilities such as e-email, instant messaging programs, chat programs (either text- or voice-based), etc., whether resident locally (e.g., on the set top device) or remotely (e.g., on a host computer). In addition, interactive links

could be used to control TV or VCR functions (channel, volume, record, program for future recording, playback, etc.), to set bookmarks for designated TV programs and/or webpages, to allow viewers to vote (e.g., for a favorite performer or in response to a news poll), to buy merchandise associated with a TV program, or to access a file or program stored at a specified URL on the set top device, on a public network (e.g., the Internet) or on private networks (e.g., America Online).

The techniques, methods and systems described here may find applicability in any computing or processing environment in which electronic content may be viewed, accessed or otherwise manipulated. For instance, the concept of using webpage overlays to provide interactive links could be applied whenever it is desirable to mix or otherwise control disparate sources of electronic content in a consistent and uniform manner. One such environment is a computer system (e.g., a Microsoft Windows-based PC or Apple Macintosh) that includes a TV tuner card and which is connected to the Internet.

Various implementations of the systems and techniques described here may be realized in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations thereof. A system or other apparatus that uses one or more of the techniques and methods described here may be implemented as a computer-readable storage medium, configured with a computer program, where the storage medium so configured causes a computer system to operate on input and/or generate output in a specific and predefined manner. Such a computer system may include one or more programmable processors that receive data and instructions from, and transmit data and

instructions to, a data storage system, and suitable input and output devices.

Each computer program may be implemented in a high-level procedural or object-oriented programming language, or in assembly or machine language if desired; and in any case, the language may be a compiled or interpreted language. Suitable processors include, by way of example, both general and special purpose microprocessors.

Generally, a processor will receive instructions and data from a read-only memory and/or a random access memory. Storage devices suitable for tangibly embodying computer program instructions and data include all forms of non-volatile memory, including semiconductor memory devices, such as EPROM, EEPROM, and flash memory devices; magnetic disks such as internal hard disks and removable disks; magneto-optical disks; and CD-ROM disks.

Any of the foregoing may be supplemented by, or implemented in, specially-designed ASICs (application-specific integrated circuits).

A number of embodiments of the present invention have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the invention. Accordingly, other embodiments are within the scope of the following claims.